WHAT IS CLAIMED IS:

1. A light scanner comprising:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning the light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;

a scanning start signal detector for detecting the light beam scanned by the optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the first imaging optical system, the optical deflector and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,

an angle $\theta M$ formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10<\theta M<35$,

the curved mirror also is part of the detecting optical system, and

in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

2. The light scanner according to claim 1, wherein the light beam emitted from the light source portion has a wavelength of 500 nm or less.

3. The light scanner according to claim 1, satisfying

$$1.6 < \theta M/\theta P + 0.98L/(L + D) < 2.2$$

where $\theta P$ is an angle between an optical axis of the light beam from the first imaging optical system and the normal to the deflection surface of the optical deflector, L is a distance between the deflection surface of the optical deflector and the vertex of the curved mirror, and D is a distance between the vertex of the curved mirror and the surface to be scanned.

4. The light scanner according to claim 3, satisfying

*Eq.* 2 $\quad 1.86 < \theta M/\theta P + 0.98L/(L + D) < 1.94.$

5. The light scanner according to claim 1, satisfying

*Eq.* 3 $\quad 0.48 < L/(L + D) < 0.75$

where L is a distance between the deflection surface of the optical deflector and the vertex of the curved mirror and D is a distance between the vertex of the curved mirror and the surface to be scanned.

6. The light scanner according to claim 1, wherein the curved mirror has an arc-shaped cross section in the sub-scanning direction.

7. The light scanner according to claim 1, wherein the curved mirror has a shape for correcting bend of a scanning line caused by oblique incidence of the light beam.

8. The light scanner according to claim 1, wherein the curved mirror has a shape that is asymmetrical with respect to the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction.

9. The light scanner according to claim 1, wherein the curved mirror is twisted so that the normal at each point, except the vertex, on a generatrix is not contained in the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction, the generatrix being a curved line intersecting with the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction.

10. The light scanner according to claim 9, wherein the angle formed by the normal at each point on the generatrix and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction becomes larger as a distance between the vertex and each point increases.

11. The light scanner according to claim 9, wherein when a direction in which a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface of the optical deflector is identified as a positive direction, a direction in which the normal at each point on the generatrix tilts with respect to the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction is identified as a positive direction.

12. The light scanner according to claim 1, wherein the curved mirror is an anamorphic mirror whose radius of curvature at its vertex is different in the main scanning direction and in the sub-scanning direction.

13. The light scanner according to claim 1, wherein the curved mirror has concave mirror surfaces in the main scanning direction and in the sub-scanning direction.

14. The light scanner according to claim 1, wherein the curved mirror has a mirror surface whose refractive power in the sub-scanning direction is different in a center and a periphery of the main scanning direction.

15. The light scanner according to claim 1, wherein the curved mirror is shaped so that a radius of curvature of a cross section in the sub-scanning

direction is not affected by the shape of a cross section in the main scanning direction.

16. The light scanner according to claim 1, wherein the first imaging optical system converges the light beam from the light source portion in the main scanning direction.

17. The light scanner according to claim 1, wherein the light source portion includes a wavelength-variable light source and a wavelength control portion.

18. The light scanner according to claim 1, further comprising a light combining means,
wherein the light source portion has at least two light sources and the light combining means is placed between the light source portion and the optical deflector so as to combine a plurality of light beams emitted from the at least two light sources.

19. The light scanner according to claim 18, further comprising a light separating means placed between the optical deflector and the surface to be scanned so as to separate the light beam combined by the light combining means into a plurality of light beams.

20. The light scanner according to claim 18, wherein light beams emitted from the at least two light sources have different wavelengths.

21. A light scanner comprising:
a light source portion for emitting a light beam having a predetermined wavelength;
an optical deflector for scanning the light beam from the light source portion;
a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;
a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;

a scanning start signal detector for detecting the light beam scanned by the optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the light source portion, the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,

an angle $\theta M$ formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10<\theta M<35$,

the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and

in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

22. A light scanner comprising:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning the light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between

the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;
a scanning start signal detector for detecting the light beam scanned by the optical deflector; and
a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,
wherein the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,
the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and
in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

23. A light scanner comprising:
a light source portion for emitting a light beam having a predetermined wavelength;
an optical deflector for scanning the light beam from the light source portion;
a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;
a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;
a scanning start signal detector for detecting the light beam scanned by the

optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the light source portion, the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,

an angle $\theta M$ formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10 < \theta M < 35$,

the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and

the light source portion is turned on so as to perform automatic power control operation at any time during a period between completion of a present scanning of a printing region followed by transmission of a light beam through a portion of the surface to be scanned that corresponds to an end of a recording paper and detection of a light beam of the next scanning by the scanning start signal detector.

24. A light scanner comprising:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning the light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam

from the optical deflector to the surface to be scanned;
a scanning start signal detector for detecting the light beam scanned by the optical deflector; and
a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,
wherein the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,
the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and
the light source portion is turned on so as to perform automatic power control operation at any time during a period between completion of a present scanning of a printing region followed by transmission of a light beam through a portion of the surface to be scanned that corresponds to an end of a recording paper and detection of a light beam of the next scanning by the scanning start signal detector.

25. An image forming apparatus comprising the light scanner according to claim 1.

26. A color image forming apparatus comprising:
a plurality of image forming units for different colors, each comprising a developing device and a photosensitive member and being held to form a cylinder;
a conveying means for moving each of the image forming units between an image forming position and a waiting position by rotating the image forming units simultaneously around an axis of the cylinder;
a transfer means for forming a color toner image on a member to be transferred by bringing the photosensitive member of the image forming unit at the image forming position into contact with the member to be

transferred and successively transferring toner images of different colors formed on each of the photosensitive members to the member to be transferred in accordance with switching of the image forming units to be positioned in the image forming position so as to superimpose the toner images of different colors; and

a light scanner for exposing the photosensitive member,

wherein the light scanner comprises:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning the light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;

a scanning start signal detector for detecting the light beam scanned by the optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the first imaging optical system, the optical deflector and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,

an angle $\theta M$ formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10<\theta M<35$,

the curved mirror also is part of the detecting optical system, and

in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector

with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

27. A color image forming apparatus comprising:

a plurality of image forming units for different colors, each comprising a developing device and a photosensitive member and being held to form a cylinder;

a conveying means for moving each of the image forming units between an image forming position and a waiting position by rotating the image forming units simultaneously around an axis of the cylinder;

a transfer means for forming a color toner image on a member to be transferred by bringing the photosensitive member of the image forming unit at the image forming position into contact with the member to be transferred and successively transferring toner images of different colors formed on each of the photosensitive members to the member to be transferred in accordance with switching of the image forming units to be positioned in the image forming position so as to superimpose the toner images of different colors; and

a light scanner for exposing the photosensitive member,

wherein the light scanner comprises:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;

a scanning start signal detector for detecting the light beam scanned by the optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the light source portion, first imaging optical system, the optical

deflector and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,
an angle θM formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10<\theta M<35$,
the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and
in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

28. A color image forming apparatus comprising:
a plurality of image forming units for different colors, each comprising a developing device and a photosensitive member and being held to form a cylinder;
a conveying means for moving each of the image forming units between an image forming position and a waiting position by rotating the image forming units simultaneously around an axis of the cylinder;
a transfer means for forming a color toner image on a member to be transferred by bringing the photosensitive member of the image forming unit at the image forming position into contact with the member to be transferred and successively transferring toner images of different colors formed on each of the photosensitive members to the member to be transferred in accordance with switching of the image forming units to be positioned in the image forming position so as to superimpose the toner images of different colors; and
a light scanner for exposing the photosensitive member, wherein the light

scanner comprises:
a light source portion for emitting a light beam having a predetermined wavelength;
an optical deflector for scanning the light beam from the light source portion;
a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;
a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;
a scanning start signal detector for detecting the light beam scanned by the optical deflector; and
a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,
wherein the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction
the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and
in the cross section taken along a sub-scanning direction, when the angle of a reflected light beam from the deflection surface of the optical deflector with respect to an incident light beam from the first imaging optical system is measured in a positive direction, the angle of a reflected light beam from the curved mirror with respect to an incident light beam from the deflection surface is measured in a negative direction.

29. A color image forming apparatus comprising:
a plurality of image forming units for different colors, each comprising a developing device and a photosensitive member and being held to form a

cylinder;

a conveying means for moving each of the image forming units between an image forming position and a waiting position by rotating the image forming units simultaneously around an axis of the cylinder;

a transfer means for forming a color toner image on a member to be transferred by bringing the photosensitive member of the image forming unit at the image forming position into contact with the member to be transferred and successively transferring toner images of different colors formed on each of the photosensitive members to the member to be transferred in accordance with switching of the image forming units to be positioned in the image forming position so as to superimpose the toner images of different colors; and

a light scanner for exposing the photosensitive member, wherein the light scanner comprises:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion to a deflection surface of the optical deflector;

a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;

a scanning start signal detector for detecting the light beam scanned by the optical deflector; and

a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,

wherein the light source portion, the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,

an angle θM formed by an optical axis of the light beam traveling to the curved mirror and the plane containing the normal to the curved mirror at its vertex and being parallel to the main scanning direction satisfies $10<\theta M<35$,

the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and

the light source portion is turned on so as to perform automatic power control operation at any time during a period between completion of a present scanning of a printing region followed by transmission of a light beam through a portion of the surface to be scanned that corresponds to an end of a recording paper and detection of a light beam of the next scanning by the scanning start signal detector.

30. A color image forming apparatus comprising:

a plurality of image forming units for different colors, each comprising a developing device and a photosensitive member and being held to form a cylinder;

a conveying means for moving each of the image forming units between an image forming position and a waiting position by rotating the image forming units simultaneously around an axis of the cylinder;

a transfer means for forming a color toner image on a member to be transferred by bringing the photosensitive member of the image forming unit at the image forming position into contact with the member to be transferred and successively transferring toner images of different colors formed on each of the photosensitive members to the member to be transferred in accordance with switching of the image forming units to be positioned in the image forming position so as to superimpose the toner images of different colors; and

a light scanner for exposing the photosensitive member, wherein the light scanner comprises:

a light source portion for emitting a light beam having a predetermined wavelength;

an optical deflector for scanning the light beam from the light source portion;

a first imaging optical system placed between the light source portion and the optical deflector for guiding the light beam from the light source portion

to a deflection surface of the optical deflector;
a second imaging optical system of a single curved mirror placed between the optical deflector and a surface to be scanned for guiding the light beam from the optical deflector to the surface to be scanned;
a scanning start signal detector for detecting the light beam scanned by the optical deflector; and
a detecting optical system placed between the optical deflector and the scanning start signal detector for guiding the light beam scanned by the optical deflector to the scanning start signal detector,
wherein the first imaging optical system, the optical deflector, and the second imaging optical system are located at different positions in a sub-scanning direction so that the light beam from the first imaging optical system enters obliquely with respect to a plane containing a normal to the deflection surface of the optical deflector and being parallel to a main scanning direction, and the light beam from the optical deflector enters obliquely with respect to a plane containing a normal to the curved mirror at its vertex and being parallel to the main scanning direction,
the light beam traveling from the curved mirror to the surface to be scanned is substantially equal to that traveling from the curved mirror to the scanning start signal detector, and
the light source portion is turned on so as to perform automatic power control operation at any time during a period between completion of a present scanning of a printing region followed by transmission of a light beam through a portion of the surface to be scanned that corresponds to an end of a recording paper and detection of a light beam of the next scanning by the scanning start signal detector.

31. The color image forming apparatus according to any one of claims 26, 27, 28, 29, and 30, wherein the curved mirror constituting the second imaging optical system of the light scanner is located close to the axis of the cylinder.

32. The color image forming apparatus according to any one of claims 26, 27, and 29, wherein the angle $\theta M$ satisfies $12.5<\theta M<17.5$.